Section 2 THE TIMES-HERALD
NEWPORT NEWS, VIRGINIA, THURSDAY, FEB. 16, 1967 PAGE 11

Langley Research Solved Problem Of Supersonic Transport's Design

By SUSAN COREY
Times-Herald Staff Writer

The day is not far away when we will be able to fly to the west coast and arrive an hour and a half before we left. That bit of "magic" will be accomplished by flight in a supersonic transport (SST)—with the "cooperation" of standard time differences.

Research at NASA's Langley Research Center has been aimed at clearing the way for a national program to build an SST. Though the decision on whether to proceed with construction of an SST rests with President Johnson and Congress, a Boeing variable sweep-wing design has been chosen —if and when. The wing gradually recedes in flight as speed increases, presenting less air resistance.

A Langley research team was first to solve the problem engineers have worked on for years—how to design a plane that could fly at supersonic as well as lower speeds. In their variable sweep-wing concept, the wing is extended to provide extra lift for take-off and landing, then can be swept back for efficient supersonic flight. Initial application of the concept was in military aircraft.

For about 10 years NASA has conducted a research program to provide industry with information basic to the construction of a safe and economically practicable supersonic commercial air transport.

Among the design goals were a speed of Mach 3 (three times the speed of sound); a 4,000 mile range; ability to operate from existing jet airports; operating costs equivalent to jet airliners now operating; and a useful lifetime of 15 years, or 30,000 to 50,000 hours of operation.

It is not expected that the United States will have an SST in operation before 1971. Britain and France pooled their efforts to win the SST race, and probably will. They selected a fixed-wing design which will fly about 1,450 miles an hour and carry 136 passengers. Called the Concorde, it will be ready to fly next year.

Russia is also building the TU144, a fixed wing aircraft designed to fly at 1,500 miles an hour and carry 121 passengers.

The chosen U. S. design will fly at about 1,800 miles an hour and carry as many as 300 passengers, so it should be able to make up for its tardiness financially. It is expected to cost about as much as the Concorde.

Laurence K. Loftin Jr., assistant director at Langley, has been in close touch with SST research.

He said that research on a long-range supersonic cruising aircraft began at Langley about 12 years ago. At that time, support was focused on development of the B-70 bomber.

In 1957 he said attention was directed to SST problems. One of these, still under consideration, is noise, the sonic boom. The problem is difficult to assess, Loftin explained, "because it is difficult to know what noise level people will be willing to accept." He said control of the "glass shattering" pressures is less of a problem than noise.

Another problem of the SST was improvement of the "lift to drag ratio." Simply, this amounts to finding a way to make the aircraft travel a greater distance on less fuel.

Because of the great amounts of fuel it must carry, the payload (passengers, baggage, etc.) the SST can carry is only about nine per cent. That means 91 per cent of the aircraft weight is divided between the weight of its fuel and structure. The American SST transport will use about 500 gallons of fuel just to taxi from the ramp to the end of the runway at a normal airport.

Langley research has improved this efficiency by almost one third in the past few years. Work continues to improve it still more.

Another problem studied at Langley was the metal to be used for construction of the aircraft, Loftin said. He explained neither aluminum or steel alloy would hold up at supersonic speeds, so titanium was chosen. "The strength to weight ratio of titanium was found to be better," Loftin said.

Further work will be done at Langley on the nozzles for the SST's four jet engines, Loftin said. He said each of the engines would produce 60,000 pounds of static thrust. The Boeing 707 jet transport's engines produce only 16,000 pounds each. In the SST, that means "when you take off, there will be 240,000 pounds pushing the aircraft," Loftin said.

He noted another problem came from the fact the world's international airports could not be rebuilt to accommodate the SST. "We had to find ways to make the aircraft able to operate well at low speeds and land and take off from ordinary airports.

Langley's approach and landing simulator was used to determine how the SST would fit in with normal flight patterns and controls at present day airports. Approach and landing was studied, with the aid of computers in aircraft, at Wallops Island.

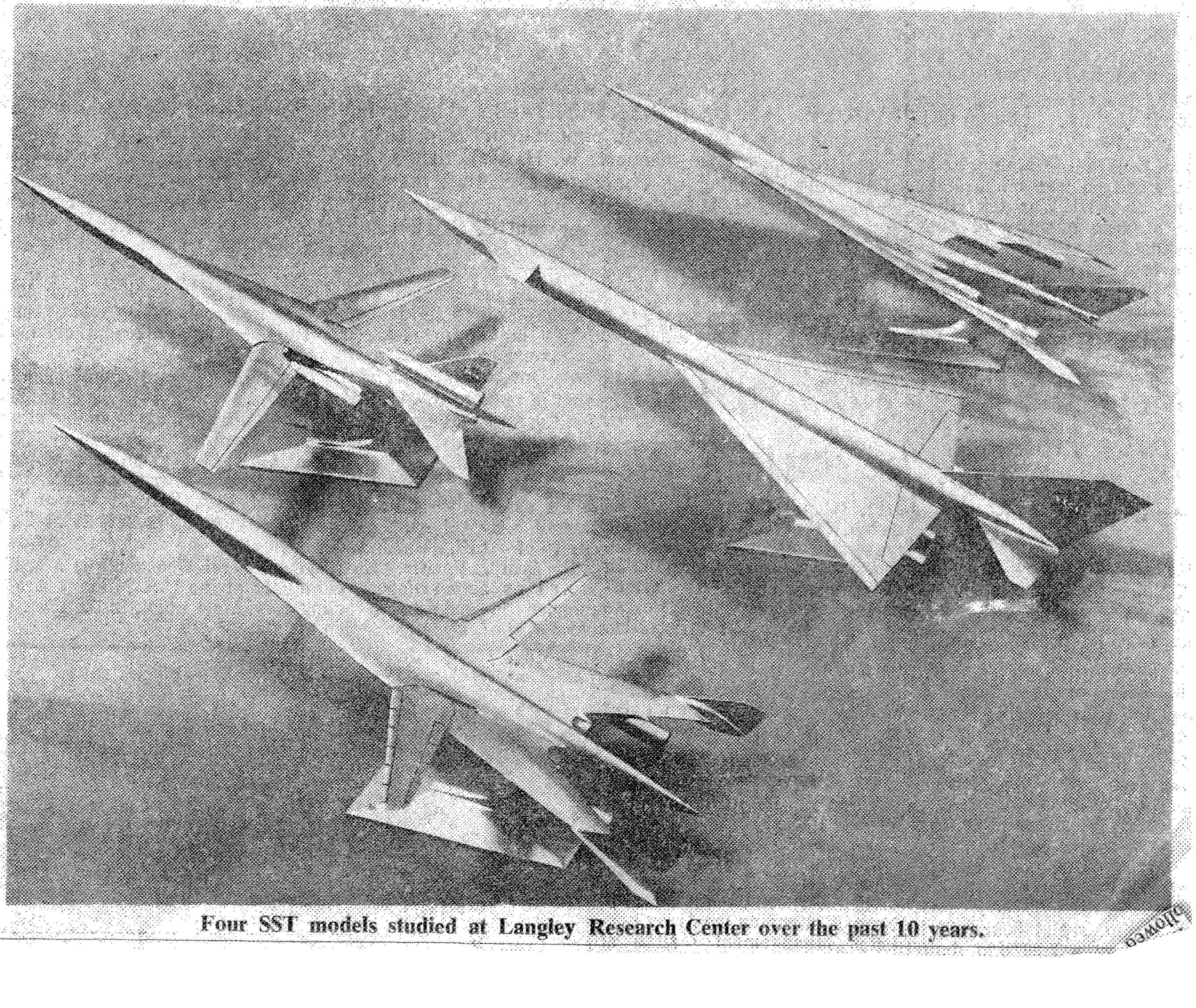
Loftin explained Langley researchers "take a promising concept and then use computers to calculate lift, drag, stability and other factors." Then, he said, changes were made if needed before wind tunnel models were built.

Langley's wind tunnels, which can test models at up to Mach 4, were built in 1955 at a cost of $15 million. It was in these tunnels that pioneer work on the sweep wing concept was done.

Loftin said the sweep wing provides better subsonic efficiency than other types tested. This would be important if an aircraft were over mid-ocean and for some reason had to slow to subsonic speeds. The convertible wings could then be swept out, giving the aircraft better range because it would use less fuel.

NASA and the Langley personnel studying the SST will serve only as advisors in the building of the SST. The program will be managed by the Federal Aviation Agency.

"We will continue working on SST type aircraft, on the sonic boom problem, and raising the lift-drag ratio," Lofton said.



Four SST models studied at Langley Research Center over the past 10 years.